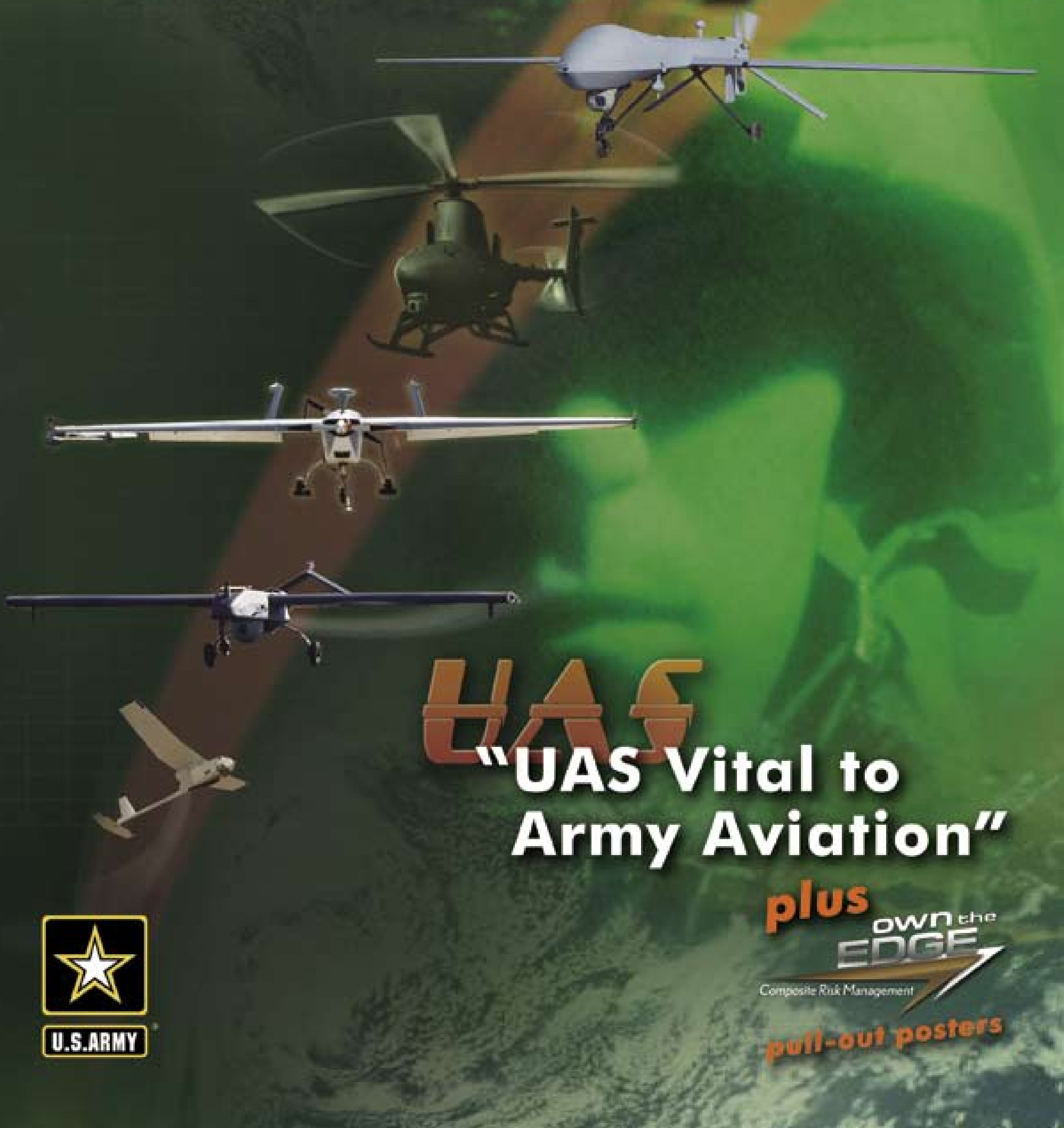
September 2006 ♦ VOL 34 ♦ NO 9

FLIGHTfax

Army Aviation Composite Risk Management Information



UAS

"UAS Vital to Army Aviation"

plus Own the EDGE Composite Risk Management pull-out posters

U.S.ARMY

FLIGHTfax

Army Aviation Composite Risk Management Information

BG William Forrester
Commander/Director of Army Safety

COL George Bilafer
Deputy Commander

John Hooks
Publishing Supervisor

Paula Allman
Managing Editor

Chris Frazier
Staff Editor

Leslie Tisdale
Art & Design

CONTENTS & FEATURES

2 BG Forrester Assumes Command of USACRC
4 UAS Vital to Army Aviation
8 A Quick Glance at UAS Accidents
9 The Evolving Role of UAS
10 ABSO: Your UAS Safety Team
12 Covering Your ARSS
14 Unmanned Aircraft Systems Standardization
16 Call Sign Hunter 71—SAVED!
19 UAS Is Here to Stay
20 ATTENTION AFRS Users
21 Airspace ... Big Sky, Little Bullet
22 **ACCIDENT BRIEFS**
24 **POSTER:** UAS

on the web HTTPS://CRC.ARMY.MIL

U.S. ARMY COMBAT READINESS CENTER

Flightfax is published monthly by the U.S. Army Combat Readiness Center, Bldg. 4905, 5th Avenue, Fort Rucker, AL 36362-5363. Address questions regarding content to the editor at DSN 558-9855 (334-255-9855). To submit an article for publication, e-mail Flightfax@crc.army.mil or fax DSN 558-9044 (334-255-9044). We reserve the right to edit all manuscripts. Address questions concerning distribution to DSN 558-2062 (334-255-2062). Visit our Web site at https://crc.army.mil.

WILLIAM FORRESTER
Brigadier General, U.S. Army
Commanding

BG FORRESTER ASSUMES COMMAND OF USACRC

BY KELLY WIDENER
U.S. ARMY COMBAT READINESS CENTER

Army safety continued its transformation here on 25 August 2006 as Director of Army Safety duties and command of the U.S. Army Combat Readiness Center (USACRC) changed hands during a ceremony in the U.S. Army Aviation Museum.

BG William H. Forrester assumed the roles and responsibilities from BG Joseph A. Smith, who held the positions for a little more than 3 years.

The USACRC is responsible for improving combat readiness and preserving combat power. As a field operating agency of the Office of the Army Chief of Staff, the USACRC is the knowledge center for all Army losses and the focal point for analyzing accident, serious incident, and combat loss reports.

After congratulating BG Smith for his contributions to Army safety and awareness, BG Forrester said to the warriors of the USACRC that together they will continue the positive trends they've blazed, always looking to raise the bar.

A 20-percent reduction in accidental losses overall is one positive trend USACRC and Army members are witnessing this fiscal year.

"Joe Smith has done something no one before him has ever been able to do. He has turned the tide," said LTG James L. Campbell, Director of Army Staff. "He has turned that mammoth battleship in saving Soldiers' lives. As a result of his passion and sheer determination, our

▲ **BG William H. Forrester takes the command flag of the U.S. Army Combat Readiness Center from LTG James L. Campbell, Director of Army Staff, as BG Joseph A. Smith, outgoing commander, looks on during a change of command ceremony at Fort Rucker, AL, on 25 August.**

United States Army reduced our accidental losses by 20 percent from last year to this year. That is Soldiers' lives … and the stakes don't get any higher."

Officials at the USACRC attribute the majority of the decline to leader involvement and the implementation of several new initiatives, including the Army Safety Management Information System-2, or ASMIS-2, POV assessment tool.

This risk-planning tool allows travelers to create a tailor-made risk analysis and receive specific guidance to lower risks on road trips. Since its inception, statistics show that Soldiers have completed more than 1.3 million assessments. Of those people who completed the assessments, four have been killed while operating a vehicle.

"It is obvious there was much work accomplished and all focused on preserving our Soldiers, civilians, and equipment," BG Forrester said about the USACRC warriors.

BG Forrester comes to the USACRC after serving as the assistant division commander (support) for the 2nd Infantry Division, Eighth U.S. Army, Korea. Though he was previously assigned at Fort Rucker as the U.S. Army Aviation Warfighting Center Chief of Staff, BG Forrester said this assignment has a broader focus over the full spectrum of the Army.

"As is the case in this great Army of ours, as one superb leader steps down, another superb leader steps forward to take the reigns and take the organization to even a higher level," LTG Campbell said. "BG Forrester joins the (USACRC) with a rich background in operational experiences. He has commanded an aviation brigade in combat … and his experiences here at Fort Rucker as the Chief of Staff of the U.S. Amy Aviation Warfighting Center, where the importance of preserving combat readiness is there every single day, will make him even more effective as a leader of the USACRC."

Drawing from his experiences, BG Forrester revealed his outlook on the way ahead for the USACRC.

"My wife and I are humbled by the continued opportunity to serve our Army," he said, "and we fully realize that our assignment at the Combat Readiness Center is just that. We look forward to forging strong professional and personal relations with organizations across the Army and the Department of Defense."

Directly following the change of command, the USACRC conducted a retirement ceremony for BG Smith, who completed more than 32 years of service. He said serving in this position was very rewarding.

"When I think about each Soldier who has died, I am convinced we have saved not some lives, but many lives. That's what it's all about." ♦

—Ms. Widener is the USACRC PAO and can be contacted at 334-255-3770 or by e-mail at Kelly.Widener@us.army.mil.

UAS Vital to Army Aviation

COL JEFF KAPPENMAN, TSM-UAS AND
COL DON HAZELWOOD, PM-UAS

The desire for dedicated reconnaissance assets in the Global War on Terrorism has led to greater numbers of Unmanned Aircraft Systems (UASs) being introduced on the battlefield.

Since the onset of Operation Iraqi Freedom (OIF), the total number of UAS and corresponding flight hours continues to grow at exponential rates. At the start of OIF, the only Army UAS capability supporting the effort was a single Hunter Company and its complement of six air vehicles (AVs) and four ground control stations (GCSs). Since then, the Army's typical rotation of UAS in Iraq has expanded significantly, with more than 579 Ravens, 60 Shadows, 4 I-GNATs, and 6 Hunters to complement various other joint UAS assets.

As of FY05, Army UASs flew a combined 152,120 total flight hours, of which 104,349 hours were flown strictly in support of combat operations. This translates into 90 percent of all UAS missions flown in combat operations. Once considered "junior varsity" to other aviation operations, UAS programs have catapulted to the forefront of combat aviation missions. Combat developers responding to calls for more and better capable systems are once again pushing the envelope of this latest technological frontier, finding ways to exploit everything this newly tapped resource can offer and then expediting this asset into the hands of commanders in the fight. This sudden explosion of UAS interest and fielded systems, however, has seen its share of growing pains, particularly in the area of aircraft mishaps.

Along with the sudden proliferation of systems over the past 3 years came an initial spike in accident rates that exceed those typically experienced in manned aviation. Accident rates, in accordance with Department of Defense Instruction (DODI) 6055.7, *Mishap Investigation, Reporting, and Recordkeeping,* are based on the number of accidents per 100,000 flight hours. Until recently, most UAS programs had yet to top the 100,000 flight hours needed to accurately provide this historical data. In FY05 alone, Shadow experienced 66 Class A through C accidents, and Hunter experienced 5 mishaps. In comparison, manned aviation experienced only 35 Class A through C accidents in FY05.

With accident rates for UASs exceeding manned aviation by up to 2.6 times, the U.S. Army Aviation Warfighting Center (USAAWC) and Program Executive Office for Aviation (PEO-AVN) combined efforts with the sole purpose of finding ways to reduce UAS mishaps. Analyzing mishaps through the Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) framework, several contributing factors in key areas came to light. High incident rates in the areas of mechanical failure (materiel) and human error (organization, training, and leadership) led to focused solutions such as better engines for Shadow and a greater emphasis on procedures, such as following checklists and using operations manuals. The USAAWC and PEO-AVN are now well underway in implementing measures across the DOTMLPF spectrum aimed at reducing UAS accidents.

Already the early application of aviation discipline and culture has yielded great benefits for the Shadow UAS. As of July 2006, the Shadow accident rates are down by 64 percent.[1]

Army manned and unmanned accidents went down due to the following factors:

— Compliance with the Vice Chief of Staff of the Army's message dated December 2005

— Aviation discipline and culture

— Mandatory safety and procedural training

— Environmental effects on equipment and personnel

— Standardization (i.e., checklists, manuals in aviation format)

— Situational awareness

— Aircrew coordination

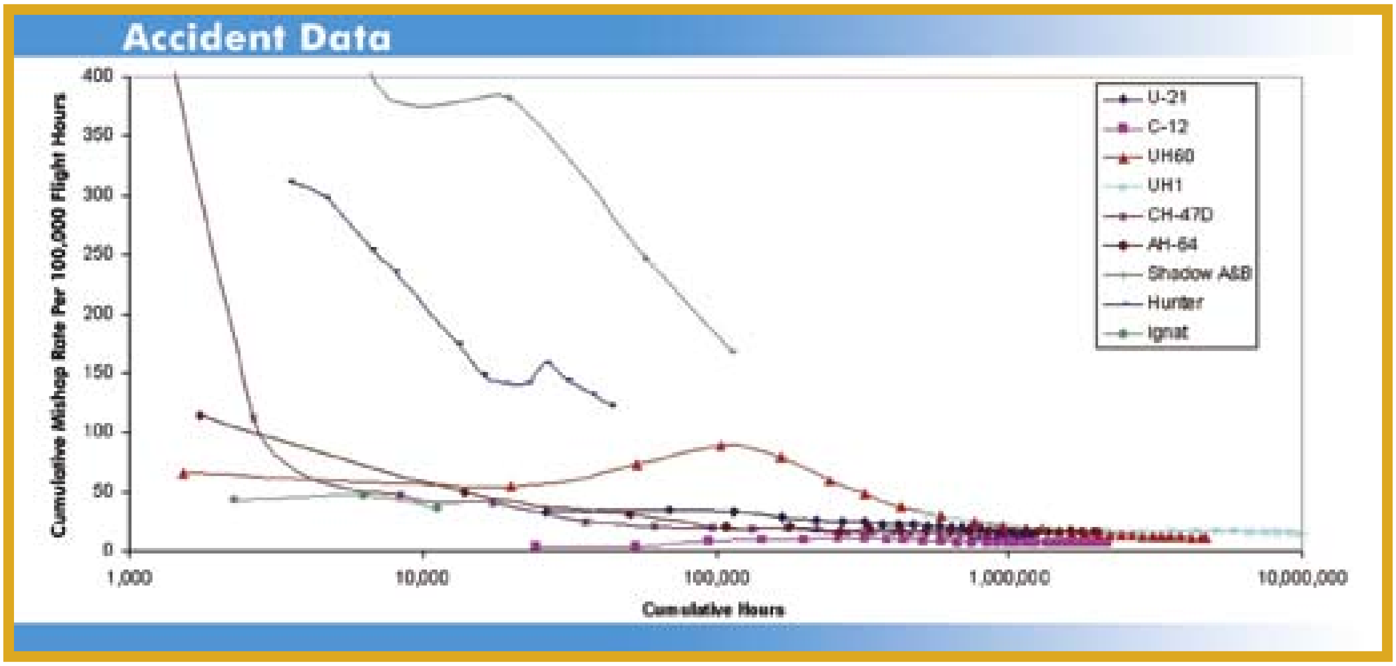
— Command influence

— Joint product managers: PEO-AVN and USAAWC initiative

— Materiel updates

This huge reduction in mishap rates for the Shadow, which is at an operational tempo of 8 to 12 times greater than was ever envisioned for this system, while lowering the overall costs of UAS programs and increasing the support available to the warfighter is the goal of the PEO-AVN and USAAWC.

Recognizing the need for a Soldier to draw the knowledge required to properly plan for and execute Army UAS operations in the combined arms fight, the USAAWC Directorate of Training and Doctrine (DOTD) published Field Manual Interim (FMI) 3-04-155, *Army Unmanned Aircraft System Operations.* This is the Army's first UAS field manual. This document provides the Army an overarching doctrinal UAS foundation. Not only does FMI 3-04-155 provide organization and overview data, but it also discusses planning considerations for successful execution, employment of UASs, checklists for planning, and an overview of the commander's



[1]Army Manned and Unmanned Aviation Accident Data as of 21 August 2006.

training responsibilities. This encourages standardization and reduces mishaps.

Organizationally, the Aviation Branch has resourced every Infantry Brigade Combat Team (BCT) with a Brigade Aviation Element (BAE) which is led by an aviation major. The mission of the BAE is to integrate and synchronize all aviation operations, including UAS operations, into the BCT's scheme of maneuver. DOTD published Training Circular (TC) 1-400, *Brigade Aviation Element Handbook,* to assist these vital aviation representatives in this important mission, and The Center for Army Lessons Learned (CALL) produced a handbook titled "Leader's Guide to A2C2 at Brigade and Below." The BAE focuses on providing employment advice and initial planning for aviation missions, UAS airspace planning and coordination, and synchronization with the air liaison officer and effects coordinator. The BAE also coordinates directly with the aviation brigade or supporting aviation task force for detailed mission planning. BAE members are the aviation experts for the maneuver brigade commander.

The Directorate of Evaluation and Standardization (DES) visited several UAS units in OIF in April and May 2006 to assess and assist units with developing their aircrew training programs. To facilitate this process, DES released TC 34-212, *UAS Commander's Guide and Aircrew Training Manual,* and updated Army Regulation (AR) 95-23, *Unmanned Aircraft System Flight Regulations,* published on 7 August 2006, to better serve Soldiers and commanders in the field.

The purpose of TC 34-212 is to help UAS commanders at all levels develop a comprehensive aircrew training program. By using the aircrew training manual, commanders ensure individual crewmembers and crew proficiency is commensurate with their units' mission and that UAS aircrew members routinely employ standard techniques and procedures. UAS aircrew members will use this manual as a "how to" source for performing crewmember duties, where performance standards and evaluation guidelines are defined so crewmembers know the level of performance expected. Each task has a description of how it should be done to meet the standard. While such training programs have been ingrained in Army Aviation for decades, this is still a relatively new concept at the Infantry BCT level. This effort, combined with the beginnings of DES/ARMS (Aviation Resource Management Survey) assistance visits, has resulted in significant gains in the level of aviation proficiency in UAS units across the Army.

While most aviation accidents are attributed to pilot error (usually about 80 percent), one surprising realization was almost 50 percent of UAS accidents were a direct result of materiel failure. For example, analysis revealed the Shadow UAS had inadequate heat protection and a lack of redundancy in the engine ignition system as the root cause of engine failures. A heat shield modification to the existing engine was developed that provides a temporary solution until a potential Shadow engine upgrade (1101 engine) fielding is conducted. As this demonstrates, PEO-AVN and the Program Manager (PM)-UAS are continuously engaged in product improvements to provide materiel solutions that increase UAS reliability.

Leadership development efforts came in the form of Army senior leader guidance addressing the need for leadership emphasis and involvement by commanders at all levels to help reduce the number of accidents. The Vice Chief of Staff, Army (VCSA), has repeatedly directed commanders "apply stringent and rigorous aviation-based training, safety, maintenance, and operation discipline" to help in this endeavor. For leaders not experienced in aviation training methods, the VCSA encouraged them to leverage their BAEs to assist or coordinate for additional oversight and assistance from embedded aviation professionals.

On 13 May 2006, another significant milestone was achieved when the HQDA Director of Force Management approved the transfer of all UAS force structure from the Military Intelligence Branch (30- and 34-series Tables of Organization and Equipment (TOEs)) to the Aviation Branch (TOE series 01). Modified TOEs (MTOEs) will follow and will be implemented over the next several years. This force structure transfer provides a key opportunity for the USAAWC to review organizational requirements and make necessary changes through the normal force development process. Crucial to this review is combat-experienced field input that helps identify deficiencies and/or excesses in personnel, training, and equipment in actual combat scenarios. This information, combined with any changes in concepts and doctrine, will be used by the Directorate of Combat Developments, Force Organization Division, to propose and implement the necessary and correct organizational changes.

These efforts already have initiated an overall downward trend in the number of UAS mishap rates. As the Global War on Terrorism continues into its fifth year, the USAAWC and PEO-AVN are fully committed to optimizing this capability for the Soldier in the field while simultaneously lowering the overall cost of ownership. Combined with our need and desire to fly in the national airspace for training, this also requires us to have improved reliability in our systems and to continue our vigilance in preventing UAS mishaps. The entire aviation community must work together to improve this new and exciting capability. UASs on the battlefield are significant combat multipliers that enhance our situational awareness, improve combat effectiveness, and save Soldiers' lives. ♦

—COL Kappenman is the TRADOC System Manager for Unmanned Aerial Vehicle Systems. He may be contacted at DSN 558-1971 (334-255-1971) or e-mail Jeffrey.kappenman@us.army.mil.

—COL Hazelwood is the Project Manager for Unmanned Aircraft Systems. He may be contacted at DSN 788-4449 (256-895-4449) or e-mail Donald.Hazelwood@us.army.mil.

A Quick Glance at UAS Accidents

BILL RAMSEY
U.S. ARMY COMBAT READINESS CENTER

With current combat operations in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), Unmanned Aircraft Systems (UASs) continue to support the Soldiers on the ground. The UAS is a key player in our war against terrorism both stateside and overseas.

As with manned aircraft systems such as the UH-60, OH-58D, and AH-64, the UAS is prone to the same causes and effects that result in accidents. Listed below you will find accident information starting with Fiscal Year 2004 (FY04). The breakout will cover Class A through C accidents for the Hunter, Shadow, and Raven UAS and the total cost of the mishap in dollars.

RQ-5A (Hunter)

Accident Class	A	B	C	Total	Total Cost	Hours Flown
FY 2004	1	1	2	4	$1,528,861	4,616.2
FY 2005	0	0	5	5	$302,906	6,482.1
FY 2006	4*	0	1	4	$3,302,906	5,395.2**
Total Count	5	1	8	13	$5,134,673	16,956.4

**Includes one MQ-5B (Hunter).*

Hunter Class A Accident Descriptions:

Case 1: Aircraft failed to respond to air vehicle operator input during external pilot training and crashed in the traffic pattern.

Case 2: UAS was on final approach to landing when the lighting system failed and the controller lost visual contact.

Case 3: UAS experienced failure of the forward engine during flight.

RQ-7A/B (Shadow)

Accident Class	A	B	C	Total	Total Cost	Hours Flown
FY 2004	0	1	2	3	$240,000	13,130.2
FY 2005	0	16	18	34	$7,240,739	37,789.9
FY 2006	0	32	17	49	$7,533,466	52,613.9**
Total Count	0	49	37	86	$15,014,205	103,534.7

The Shadow Class B accidents for FY06 indicate there were 24 suspected materiel failures, which included:

- Engine failures
- Ignition failures
- Generator failures

There were four accidents attributed to human failure, which include:

- Launching of UAS while at 50 percent throttle or idle speed
- Launching of UAS without engine oil

RQ-11 (Raven)

Accident Class	A	B	C	Total	Total Cost	Hours Flown
FY 2004	0	0	5	5	$100,000	1,598.0
FY 2005	0	0	19	19	$560,042	17,159.1
FY 2006	0	0	42*	44	$757,015	9,739.6**
Total Count	0	0	66	68	$1,417,057	28,496.7

**Note: During review of the accident data base, two Raven accidents were classified as Class B accidents with a cost of $200,000 each. It is suspected an error was made in reporting the cost of the mishaps; therefore, for this article, both accidents were placed in Class C column.*

A review of the FY06 Raven Class C accidents indicated the following as causes for the reported accidents (27 of the 42 incidents were attributed to one of the problems listed below):

- Lost communication feed
- Sporadic interference
- Lost video link
- Lost computer link

FY05 and FY06 UAS Breakdown

Mission Combat:70% Training: 24% Unknown: 6%

Cause Factors	Percentage by Type UAS
73% Materiel Failure (Definite or Suspected)	Shadow, RQ-7A/B: 66%
26% Human Error (Definite or Suspected)	Hunter, RQ-5A: 9%
1% Environmental	Raven, RQ-11: 20%
	*IGNAT, RQ-1L: 1%
	Not reported: 4%

**Note: IGNAT accident data was not included in this article.*
***Includes hours through July 2006.*

Editor's note: Data chart provided by Scotty Johnson, Air Safety Specialist for UAS, Aviation Branch Safety Office, Fort Rucker, AL, and are current from the USACRC database as of 25 June 2006.

—The author may be contacted at DSN 558-3644 (334-255-3644) or by e-mail at william.ramsey@crc.army.mil.

The Evolving Role of UAS

CW4 DAVE FORD
UAS SAFETY OFFICER FOR PM-UAS
REDSTONE ARSENAL, AL

Under the cover of darkness, the insurgent walks the street unnoticed. When he is sure he is all alone, he plants his improvised explosive device and returns to a nearby house. Thinking he has succeeded, the insurgent relaxes. However, his actions that night had not gone unnoticed. In fact, he was being watched from above. Later he will be awakened by the assault of Iraqi and American Soldiers, who have come to take him into custody. It's another capture made possible by the unparalleled efforts of our unseen warriors—the Unmanned Aircraft System (UAS) operators and maintainers.

The demand by commanders for eyes in the sky continues to climb, and our Soldiers are meeting that need. UAS are operating at 8 to 12 times their planned utilization rates. Within this last year, our units' monthly flying hours have doubled, and we have surpassed 100,000 flight hours. The vast majority of UAS flight hours have been in a combat theater on real-world missions. No other system can claim that. However, with increased use comes an increase in accidents. And although our accident rate for UAS has decreased, there still is room for improvement.

Decreasing our accident rate in UAS will not happen overnight, but the rate can be drastically reduced by following some simple techniques. Leadership, from frontline NCOs to senior commanders, must take an active role in instilling the discipline and attention to detail manned aviation has relied on to maintain its success rate. Our maintainers must be corrected when not using checklists and should apply attention to detail when performing maintenance and service on aerial vehicles. First-line supervisors must be involved in the day-to-day operations in and around the flight line—correcting, motivating, and evaluating their Soldiers.

Aircrew coordination also must be integrated into every launch and recovery operation, and accidents must be investigated and reported correctly in a timely manner. We need help from the U.S. Army Combat Readiness Center (USACRC) and Corpus Christi Army Depot in accident investigations to determine the root causes and develop an institutional knowledge base in UAS mishaps. UASs will continue to grow in size, cost, and weapons, so the time to build that knowledge base is now. In addition, individuals have got to be held accountable for their actions. When mistakes are made, we must address the issues in after-action reviews and during shift change briefs. Educating fellow Soldiers on our mistakes can prevent similar accidents from occurring.

Unmanned aircraft units that have been trained and mentored by safety, standardization, and maintenance officers from the manned community have a significantly lower accident rate than units that have not. It is imperative our unmanned units seek out assistance from the combat aviation brigades, FORSCOM, Aviation Branch Safety Office, and the USACRC. A command inspection program for the unmanned units is a necessity. Our future is clear: aviation units must embrace the unmanned community and share the institutional knowledge they have learned over the years, instilling aviation culture and discipline in the unmanned units.

Our commanders are capitalizing on the intelligence, surveillance, and reconnaissance capabilities of unmanned systems and the real-time intelligence that gives them a situational awareness unmatched by any other military in the world. In the future, you may see unmanned systems flying in support of disaster relief, border guards, or counter drug missions. We are expanding the areas where we are allowed to train and work with the Federal Aviation Administration on flying in national airspace. The future demands on unmanned systems will be high, but we can meet that demand safely with your help. Own the Edge! ♦

—The author may be contacted at (256) 895-3360 or by e-mail at david.ford@tuav.redstone.army.mil.

ABSO: Your UAS Safety Team

SCOTTY JOHNSON
AIR SAFETY SPECIALIST, AVIATION BRANCH SAFETY OFFICE
U.S. ARMY AVIATION WARFIGHTING CENTER
FORT RUCKER, AL

For years, the Aviation Branch Safety Office (ABSO) has managed manned aviation safety programs. Over the past 3 years, however, the ABSO has been involved in ensuring Unmanned Aircraft Systems (UASs) are integrated into Army Aviation accident prevention programs, as well.

Training and Doctrine Command (TRADOC) Regulation 385-2, *TRADOC Safety Program,* establishes proponency for safety in each branch. The basic responsibilities of branch safety proponency are to integrate safety and Composite Risk Management (CRM) into the TRADOC domains of Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF); monitor the safety performance of branch units and school products; and develop safety lessons learned and controls for hazards identified. Proponency for Army Aviation safety is under the control of the Branch Chief and Commander of the U.S. Army Aviation Warfighting Center (USAAWC), Fort Rucker, AL, and managed by the ABSO.

The following illustrates how the ABSO addresses its UAS responsibilities into the TRADOC domains of DOTMLPF:

• **Doctrine.** The ABSO reviews UAS doctrinal manuals developed by the USAAWC for general integration of safety and, specifically, CRM. The ABSO UAS team has direct access to the UAS aviation doctrinal sources (USAAWC command and directorates); therefore, questions from the field regarding UAS aviation safety doctrine and Army UAS Accident Prevention Programs management should be directed to ABSO.

Although the U.S. Army Combat Readiness Center (USACRC) provides some aviation safety training (such as the Aviation Safety Officer Course); investigates all Class A and selected Class B aviation accidents; produces aviation related media products such as *Flightfax*, videos, and posters; and researches and analyzes aviation accident cause factors, they do not develop aviation doctrine. The USACRC's mission is directed more toward providing a centralized focus on holistic and composite loss for the entire Army.

• **Organization.** The ABSO works closely with the office of Aviation Proponency to ensure UAS units' Tables of Organization and Equipment (TOEs), modified TOEs (MTOEs), or Tables of Distribution and Allowances (TDAs) have appropriate safety staff representation. UAS organizational designs are currently under review.

• **Training and Leadership.** The ABSO is the proponent for safety in aviation training at Fort Rucker and Armywide. The ABSO UAS team has provided CRM and aviation safety program management to several leader development courses here at Fort Rucker. The ABSO monitors all professional development courses at the USAAWC for safety and CRM integration. The ABSO UAS team also provides CRM and safety program seminar training to UAS units worldwide.

• **Materiel.** The ABSO continually analyzes UAS mishap reports for cause factors and to identify hazards. Materiel factor trends identified in this analysis quickly are brought to the attention of the command. Working closely with the U.S. Army Aviation and Missile Command (AMCOM), the ABSO assists in developing and implementing materiel deficiency countermeasures. The ABSO UAS team also works closely with the TRADOC System Manager UAS (TSM-UAS) and the Program Manager UAS (PM-UAS) to ensure systems safety is integrated into the aviation materiel development and fielding process.

• **Personnel and Facilities.** Ultimately, we are all continuously focusing on the preservation of all our combat power (personnel, facilities, and equipment) so we can execute our mission. To that end, everything the ABSO does is tied to that goal, and we use all of our safety resources, air and ground, to address that mission imperative.

Another major duty of the ABSO staff includes onsite assistance and evaluation of UAS units. As the Branch Chief's representative, the UAS air safety specialist on the ABSO staff provides the advice and information the UAS units in the field need and, at the same time, brings back information the Branch Chief needs about the safety status of those UAS units.

Traveling with the Directorate of Evaluation and Standardization (DES) teams, the UAS safety subject matter expert visits all Active Component aviation units and many Reserve Component units around the world. The ABSO is the only branch safety office in the U.S. Army that performs this function on a worldwide basis. This is considered a critical ABSO responsibility because these periodic visits ensure viable safety programs based on CRM tactics, techniques, and procedures continue to be viable and effective in all UAS units. Additionally, it ensures the Branch Chief's areas of interest are understood and emphasized, and lessons learned and countermeasures are shared among UAS units.

Currently, the ABSO is involved in the UAS Integrated Product Team and UAS System Safety Working Group. The ABSO also serves as the Aviation Branch Chief's representative and is responsible for coordinating branch comments concerning UAS Safety of Flight messages and Aviation Safety Action Messages prepared by the commander, AMCOM. Furthermore, the ABSO has been involved in investigating and assisting in UAS accident investigations worldwide and is working closely with the CRC to develop a UAS accident report that will capture UAS-specific data.

As we continue to transform Army Aviation (manned and unmanned systems) into the future force, the ABSO's work remains more relevant than ever. There is little doubt the number of UASs in the field will continue to grow rapidly, and the number of UAS accidents we've had so far exemplify the importance of solving safety issues. UASs are significant combat multipliers that enhance our situational awareness, improve combat effectiveness, and save Soldiers' lives. The ABSO staff stands ready to assist commanders in the UAS safety arena in accomplishing your warfighting mission safely. Own the Edge! ♦

—The author is an Air Safety Specialist with UAS, UH-60, UH-1, and ALSE at the Aviation Branch Safety Office. He may be contacted at DSN 558-1745 (334-255-1745) or by e-mail at robert.johnson2@us.army.mil.

Covering Your ARSS

STEPHEN W. STILWELL
AVIATION APPLIED TECHNOLOGY DIRECTORATE
U.S. ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
FORT EUSTIS, VA

There has been a proliferation of Unmanned Aircraft Systems (UASs) being marketed and fielded recently in both fixed- and rotary-wing configurations. Historically, UASs are used in reconnaissance, surveillance, and target acquisition (RSTA) roles. They have evolved from simple remote-control airplanes with cameras strapped on them to more sophisticated platforms with sensor suites. UASs range in size from the Wasp and Raven to the Predator and Global Hawk.

The Office of the Secretary of Defense's UAS Roadmap 2005-2030 states there is a need for more armed UAS capabilities. Even with advances in UAS technology, only a few of the fielded UASs are armed. The weapons typically carried are modified versions of munitions for manned aircraft (Predator with Hellfire) or weapons that have been converted for use on UAS (Hunter with Viper Strike). In order to meet the armed UAS need, different types of weapons and sensor packages are needed due to platform payload limitations.

The U.S. Army's Aviation Applied Technology Directorate (AATD) at Fort Eustis, VA, is currently working on an umbrella Science and Technology program called the Aerial Delivery of Effects from Lightweight Aircraft (ADELA). The purpose of this program is to move UASs beyond the RSTA role. This is done by taking advantage of the inherent potential of UAS through:

- Integrating novel mission equipment packages
- Scaleable effects (enough bang to do the job)
- Using existing and emerging low-cost sensors and weapons
- Demonstrating remote targeting/engagement capabilities
- Building on manned-unmanned teaming

The payoff will be enhancing manned systems survivability by reducing exposure in complex, hostile terrain, and precision engagement of high-value, high-risk targets.

Arming UASs is not as easy as just strapping weapons on the platform. Under ADELA, AATD is exploring capabilities believed necessary to successfully arm and field UASs, regardless of size. Some areas of interest are firing constraints, firing command latency, and Integrated Fire and Flight Control (IFFC). IFFC makes autonomous weapons engagements more user-friendly by having the unmanned aircraft flight control system fly the aircraft into constraints once the operator has given the fire command. This simplifies the engagement process by not needing to manually fly the aircraft into constraints in order to fire weapons.

One of the ADELA programs is the Autonomous Rotorcraft Sniper System (ARSS). As the name implies, the program intent is to integrate a sniper system onto a rotary-wing unmanned aircraft. ARSS will allow commanders to have a sniper capability on a platform that can get line-of-sight (LOS) to a target by going above or around obstacles. This capability would provide the accurate delivery of fire on targets with little or no collateral damage. Possible uses for such a system are counter-sniper missions and taking out high-value, time-critical targets, especially in urban settings.

The ARSS system uses a lightweight turret, called the Precision Weapons Platform (PWP) [figure 1], developed by the Utah State University Research Foundation and adapted for use on AATD's Vigilante. Vigilante is a vertical takeoff and landing rotary test bed UAS designed and built by Advance Technologies, Inc. and Science Applications

▲ Fig. 1. ARSS PWP

▲ Fig. 2. Vigilante

▲ Fig. 3. PWP Weapon Payload

International Corp. [figure 2]. The PWP weapon payload is an RND Manufacturing Edge 2000 .338 Lapua Magnum rifle, two situational awareness cameras, a rifle scope with cameras attached that give two levels of zoom, and a thermal weapon sight [figure 3]. The system is to have an accuracy of less than 0.582 mils.

The operator's station is designed to be similar to a video game [figure 4]. Video imagery from the sensors is displayed on a flat-panel monitor. Crosshairs from the rifle scope and thermal weapon sight will be shown for targeting purposes. The operator has a choice of controllers, either a game pad or a joystick, to perform the aiming, arming, safing, and firing tasks. Changing cameras or fields of view can also be done with the controller. A laptop is used for processing commands and changing modes of operation for the system.

Testing is scheduled for the first quarter of FY07. Engagements will be conducted at fixed ranges from 200 to 1,500 meters at man-sized targets on a 4- by 4-foot target board. The Vigilante will hover over the firing point to provide the shooter with a steady platform and known range. Hover heights will be varied to simulate changing LOS. Ranges of particular interest are 300 meters (M4/M16 range) and 900 meters (7.62 mm sniper rifle range) for showing system suitability.

If successful, there is interest in incorporating a computer aiding aiming and a laser range finder to the system. These additions would allow for engagements at any range within the weapon's envelope, making the ARSS a more dynamic system with real-world applicability.

With programs like ADELA and ARSS, AATD is working to bring relevant technologies to the warfighter. The goal is to lay the foundation for capabilities that are platform independent. ♦

—Mr. Stilwell is a Senior Project Engineer on the Weapons and Sensors Team, Systems Integration Division, Aviation Applied Technology Directorate (AATD), U.S. Army Research, Development and Engineering Command, Fort Eustis, VA. He can be reached at DSN 826-3393 (757-878-3393), or by e-mail at sstilwell@aatd.eustis.army.mil.

▲ Fig. 4. PWP Operator's Station

UAS Standardization

CW5 (RET) BILL TOMPKINS
DIRECTORATE OF EVALUATION AND STANDARDIZATION
U.S. ARMY AVIATION WARFIGHTING CENTER
FORT RUCKER, AL

When I wrote the article "Standardizing UAV Operations" in August 2004, I said standardization programs were in their infancy compared to manned aviation. The good news is, while our legs may be shaky at times, we have certainly passed the crawl stage and are seriously attempting to run.

At the root of the Unmanned Aircraft System (UAS) safety and standardization problem was the lack of regulatory guidance. The revised Army Regulation (AR) 95-23, *Unmanned Aircraft System Flight Regulations,* along with Training Circular (TC) 1-600, *Unmanned Aircraft Systems Commander's Guide and Aircrew Training Manual,* has been published and provides more detailed guidance on execution of the aircrew training program (ATP). In addition, an Unmanned Aircraft Systems Instructor Operator Course is now up and running at the UAS Training Battalion at Fort Huachuca, AZ. With these changes, crew selection, risk assessment, and the mission briefing process are, in most cases, very similar to manned aviation.

The implementation of safety and standardization programs in Shadow platoons varies from successful to nonexistent. The success a platoon experiences can be attributed not only to the knowledge of standards on the part of the platoon warrant officers, but in their ability to articulate the standards to the chain of command. While some of the units are very successful, others have experienced what can only be characterized as gross failures.

A lack of discipline in use of the checklist and a lack of basic aircrew coordination are two major contributors to an all-too-high accident rate. These are easy fixes with leadership involvement. For example, at a recent user's conference, a Shadow platoon from the 82nd Airborne Division, Fort Bragg, NC, briefed that they had experienced only five aircraft mishaps throughout two tours of duty in Iraq. This is an unprecedented achievement in the Shadow UAS community.

On the other hand, a platoon from another division briefed that after the completion of one rotation, they had lost 26 aircraft. The difference was obvious. The platoon from Fort Bragg had a rigorous safety, standardization, and maintenance program. Conversely, the platoon from the other division actually boasted in their briefing about known violations of technical manual guidance. This is an obvious leadership issue. The warrant officer from the 82nd explained he was hands-on and concerned he might be micromanaging. I don't think that was the case at all.

I think this warrant officer exercised basic leadership skills, whether formal or informal, and that's what UAS units need. Most of these Soldiers are great Americans and want to do the right thing; however, they don't always have the support of their chain of command or they don't really know what right looks like. This is where we need our manned aviation brothers to lend a hand. You can start by educating yourself and the chains of command on UAS standards and then help these Soldiers reach that higher standard.

The "Huey" of the UAS fleet is the RQ-5 Hunter. The Hunter is not really supposed to be in the inventory, but we keep finding a use for it. From a safety and standardization point of view, the Hunter UAS issues are much the same as manned aviation units. The availability of trained flight operations, standardization, and safety personnel eliminate the bulk of the problems faced by Shadow platoons. The experience of the school-trained and seasoned aviation safety and standardization officer easily transfers to the UAS company operations and ensures their success.

Before I close, I also have to mention the little guy, the RQ-11 Raven UAS. The Raven does not have traditional ATP requirements, but a simplified program has been developed and published in TC 1-611, *Small Unmanned Aircraft System Aircrew Training Manual.* This includes a simple program that progresses an operator from "mission prep" status to "mission ready" and requires semi-annual proficiency evaluations. The only form required for tracking ATP requirements is DA Form 7122, which is kept in the unit training folder. There is no readiness level progression, nor flight records or individual aircrew training folder (IATF). This amounts to little more than a good Army driving program or crew served weapons qualification. The small UAS aircrew training manual (ATM), along with the master trainer program, needs to be implemented as soon as possible. Although it is smaller than most remote control planes operated by hobbyists, the same rules do not apply. The current Federal Aviation Administration (FAA) guidance is that small military UASs, like their bigger brothers, must be operated in active restricted airspace unless a certificate of authorization has been approved by the FAA.

The Directorate of Evaluation and Standardization (DES) now has a full staff in the UAS Branch that includes my position as DES UAS branch chief, a UAS warrant officer, Shadow standardization operator, and a Raven master trainer. In addition, be sure to check out the DES Information Portal on the Army Knowledge Online (AKO) Web site at **www.us.army.mil/** by using the instructions below:

- **Army Knowledge Online**
  - **Files (in the yellow at the upper right side)**
    - **U.S Army Organizations**
    - **TRADOC**
    - **Schools**
    - **Aviation**
    - **DES Information Portal (under knowledge centers)**
    - **UAV Branch**

—The author is the DES UAS Branch Chief and can be contacted at DSN 558-3475 (334-255-3475) or by e-mail at william.tompkins@rucker.army.mil.

Call Sign Hunter 71—SAVED!

CW4 JIM RYAN
HHSC, 15TH MI BN
FORT HOOD, TX

It was a cold, wet, miserable February night over the desert of Iraq as Call Sign Hunter 71 pressed through the sky homeward bound. The twin-engine RQ-5A Unmanned Aircraft System (UAS) was cruising comfortably at 8,000 feet above ground level (AGL), maintaining 70 knots en route to Balad Airfield.

The weather had called for clear skies and unrestricted visibility; however, as often the case for this time of year, the conditions were changing for the worse. Now flying between cloud decks, the intent was to descend in a clear area northwest of the airfield and then, once below the clouds, proceed inbound for Runway 32. Due to the worsening weather conditions and the chance of encountering icing, the ground control shelter (GCS) was manned by the unit's most experienced operators.

At 16 miles out, the GCS crew frequency changed from approach to tower and requested permission to occupy the runway for recovery. It was a quiet night, and tower, having no other fixed-wing traffic, gave the recovery crew the go-ahead. The ground crew quickly prepped the recovery area by stringing arresting cables across the runway and manning the external control boxes.

At 8 miles out, the crew was readying for decent when the aircraft experienced a violent loss of altitude. At the same time, the GCS caution panel lit up and the flight telemetry indicted something disastrous had happened. What the crew didn't know at the time was Hunter 71 had flown through extreme turbulence, sheering one of the two vertical fins and knocking out all external lights.

As the emergency unfolded, maintaining control of the aircraft was the primary concern of the crew as they executed their emergency action items. Fighting to understand what had happened, the crew quickly brought the aircraft under control and continued toward the recovery airfield.

As the crew used the onboard payload to visually check the health of the aircraft, it became apparent their worst fears were being realized—the left vertical fin and rudder were missing. This created a forward center of gravity (CG) issue and had knocked out all external lighting. The Hunter is unique in the Army UAS world, as it is the only air vehicle landed by an external pilot (EP). The EP stands on the edge of the runway abeam the touchdown point and visually lands the Hunter with a handheld control box. The airspeed, altitude, and heading are fed to the EP through a headset by the operators in the GCS. With the loss of external lighting, there would be no way for the EP to see, let alone land, the aircraft.

Given this problem, the decision would have to be made whether to deploy the parachute or attempt to land the aircraft without lights. Activation of the parachute is always a risky proposition because it could fail to deploy, get caught in one of the props, or the aircraft could come down in water or worse. Even if successfully deployed, the aircraft would more than likely sustain substantial damage on impact. The loss of a multimillion dollar aircraft had to be weighed against crashing at the airfield on landing.

Under this backdrop, the company commander quickly huddled his NCOs to make an informed decision. They had several hours of fuel on board but not enough to make daylight. The decision to remain airborne was also weighed against other possible structural damage to the airframe. After a brief discussion, the consensus was reached to make an attempt to land. If the crew could

Two External Pilots are conducting a go-round for a Hunter UAS.

sufficiently illuminate the landing area with spotlights, then the EP could execute the equivalent of a no-gyro approach and land the aircraft safely on the runway. If the EP couldn't acquire it, then he would execute a go-around and fly the aircraft to a safe location for parachute activation.

Tower was informed of the emergency and the crew's intentions. With no other aircraft in the area, tower suggested the use of the airfield precision approach radar (PAR) to assist in the recovery. This made sense because it provided uncorrupted terminal guidance for the approach. The aircraft was flown out 5 miles and proceeded in on the no-gyro PAR. The approach went smoothly, but it was quickly realized the PAR was the wrong choice for the approach. By design, the EP and arresting gear are located midfield for bi-directional landing. This meant they were 5,500 feet from the runway threshold and too far away to illuminate the aircraft at decision height.

The approach was immediately broken off, and the aircraft proceeded back out to the 5-mile point for an airport surveillance radar approach. By conducting the surveillance approach, they could still get heading calls from radar but they couldn't descend below 400 feet AGL until they acquired the aircraft. This would allow them to safely continue the approach past the runway threshold until it could be illuminated. To help stack the odds of acquiring the aircraft with the search lights, the decision was made to send one of the three spotlights 1,500 feet down the runway to illuminate the aircraft early and assist the other two in acquiring the target.

Once again, the aircraft proceeded inbound on the radar approach. Standing in the dark along the edge of the runway was the EP, SFC Dan Herold. SFC Herold, arguably the most experienced EP in the U.S. Army, was now a busy man. As he stared off into the dark, he was receiving a no-gyro approach from air traffic control (ATC) and airspeed and altitude callouts from the GCS all at the same time through his headset.

As the aircraft came within 2,000 feet of the recovery site, the forward searchlight found its target. It finally illuminated the aircraft at 400 feet AGL, 60 knots, and 1,000 feet from the landing point in a significant crab. SFC Herold, with only seconds to either get the aircraft on the ground or lose visual contact, executed a slip-through full rudder application and brought it down just short of the intended landing point. As he aligned the aircraft for touchdown, the added airspeed caused the Hunter to float 3 feet over the arresting gear. Undeterred, SFC Herold continued the approach, touching down just past the arresting gear. With no brakes on the aircraft, SFC Herold cut the engines and continued to steer down the runway. As the aircraft rolled past the lights, he maintained heading through callouts from the GCS until the confirmed full stop—2,000 feet down the runway. When the crew found the aircraft, it had drifted 5 feet off the runway and was parked upright in the dirt.

A post-incident inspection of the aircraft revealed not only the loss of the left vertical fin and rudder, but also significant damage to both wings where they connected to the tail boom. The loss of exterior lights was the result of an electrical short caused when the position light on the vertical fin was yanked out of the wire harness.

In the aftermath of the incident, much praise was given for the crew's teamwork in the successful recovery of the aircraft. Personnel in the entire chain of command exhibited sound judgment and acted decisively to limit damage to Class D. Of particular note was the superior airmanship of SFC Dan Herold, whose calmness under pressure and unflinching concentration are worthy of a man who wears master aviator wings. ♦

—CW4 Ryan is the standardization instructor pilot for 15th Military Intelligence (MI) (Aerial Exploitation) Battalion and is responsible for all 15th MI manned and unmanned aircraft. For more information on this article, you may contact him at (254) 288-1180 or by e-mail at james.ryan3@us.army.mil.

UAS is Here to Stay!

CW3 ERIN REED
A CO., 15TH MI BN
FORT HOOD, TX

"Army 212, traffic is a Hunter turning base for Alpha taxiway, wind 150 at 5, you're clear to land."

▲ A Hunter landing with an RC-12 Guardrail holding short. Helicopters are kept off the taxiway so they don't flip the Hunter when they taxi by.

With that radio call, "joint use" has taken on a whole new meaning. As Unmanned Aircraft Systems (UASs) have grown in size and capabilities, they've also started to compete for our airspace. In 2000, the Army only had one Hunter Company equipped with eight aircraft. Today, however, the Army has 3 Hunter Companies, 50 Shadow platoons, and 200 Raven systems, and they're all competing for the airspace we aviators thought was exclusively for manned aircraft use.

But these UASs have been pulling their weight. Last year alone they flew more than 100,000 hours in support of Operation Iraqi Freedom (OIF). Much of those hours involved boring, mundane patrols. But when a Shadow can stay on station for 5 hours and a Hunter for 20, it frees up our heavily committed manned aircraft for other missions.

The challenge has always been how to safely integrate UASs into what has become very busy airspace. While great strides were made in the integration of UASs into combat operations, the Federal Aviation Administration (FAA) has remained unimpressed. After their experiences in OIF, returning UAS units wanted to continue to train like they fight and were looking to leave the restricted areas and fly in the national airspace system (NAS) like the rest of aviation. This push for greater access to the NAS caused the FAA to dedicate a team to review UAS certificates of approval (COAs). Anytime a UAS is flown outside of a restricted area, it requires a COA. The COA places restrictions, like the need for a chase plane, on the operating unit. To realign the process, in the fall of 2005, the FAA revoked all existing UAS COAs and issued strict guidance on a new approval process.

It was under this strict new policy that A Company, 15th Military Intelligence Battalion, joined the fray. After upgrading their Hunter UAS from the RQ-5A to the MQ-5B, A Company was faced with a runway dilemma. In the past, the RQ-5A needed fewer than 3,000 feet for bi-direction operations; however, under the new MQ-5Bs, they need more than 4,000 feet. Longhorn, the landing strip A Company had used since 1995, was too short by 1,000 feet, and the only viable airfield near the restricted area was Robert Gray Army Airfield (AAF).

Gray, arguably one of the Army's most congested Class D airspace, is a joint military and civilian airfield located on the southwest side of Fort Hood. Gray supports two Army fixed units; an Air Force fighter detachment on presidential strip alert; a brigade of helicopters, large troop, and equipment jets; and about 40 commercial takeoffs and landings a day.

If UASs could be safely integrated at Gray, then theoretically they could be integrated anywhere. The trick would be to develop good risk mitigation, along with control measures that satisfied not only the FAA, but those who managed the airfield. The advantage A Company had over most of the UAS community was having senior aviators. The Hunter is part of an Aerial Exploitation Battalion, in which the entire chain of command is rated aviators.

During the approval process, A Company did not remain dormant. While this upper-level coordination was going on, the unit conducted numerous classes and safety briefings in preparation for the first flight. Training ranged from risk assessment worksheets to aviation topics such as airspace, radio communications, and aircrew coordination.

The company received numerous range, airfield, and flight operation orientations. To build trust and foster solid relationships, they also participated in exchanges with air traffic control personnel in the Army radar approach control and tower. To ensure everyone was familiar with all the movements and communications required, the company conducted rehearsals covering every radio call to be made. They then followed up with continuous rock drills, which covered every aspect of movement on the airfield. In the end, the process took 8 months and encompassed many firsts for UAS, such as the first airworthiness release. On 8 May 2006, the FAA granted the first of the new COAs to Robert Gray AAF.

The approval of the COA and the safe execution of flight operations were not rushed events. They were the result of in-depth analysis of the risks, meticulous planning, constant coordination, and numerous realistic rehearsals with all participating organizations. All of the coordination, training, and hard work paid off when Hunter 303 took to the air without a hitch on 22 May 2006.

While there had been some resistance to the idea when first coordinated, it didn't take long for everyone to become comfortable with the operation. This is a testament to the foresight, innovation, and acceptance to change of not only those trying to improve military operations and advance aviation technology, but also those in supporting agencies. UAS is here to stay. As the UAS community continues to charter new skies, we as aviators need to ensure we do our part to safely integrate them into our airspace. ♦

—CW3 Erin Reed is the A Co., 15th Military Intelligence Battalion safety officer. For more information on this article, you may contact her at (254) 288-9249 or by e-mail at erin.r.reed@us.army.mil.

ATTENTION AFRS USERS

The Directorate of Combat Developments understands the need to replace the Automated Flight Record System (AFRS) program, and help is on the horizon. The replacement program for the AFRS is the Centralized Aviation Flight Records System (CAFRS). This program will be fielded during the first quarter of Fiscal Year 2007. CAFRS will be Windows XP-based and capable of maintaining both the flight and training records for rated and non-rated crewmembers, Unmanned Aircraft System operators, and air traffic services personnel. The goal of CAFRS is to provide ease of use, greater functionality, visibility of flight and training records, and interoperability with other systems.

—For more information, contact CW4 Tony DeGusipe, AMPS/CAFRS Project Officer, Directorate of Combat Developments, Fort Rucker, AL, DSN 558-1935 (334-255-1935) or e-mail anthony.p.degusipe@us.army.mil.

Airspace ... Big Sky, Little Bullet

LTC (RET) ANDREW T. LIEBEKNECHT
FEDERAL SECTOR DEFENSE CONTRACTOR

Over the years, I've learned the "Big Sky, Little Bullet" theory is not the case in today's military. Airspace concerns are a reality, as shown by the accidental downing of two Black Hawks in the Iraq no-fly zone immediately after Desert Shield/Desert Storm. The old days of see and avoid are gone, but the need for command and control of these assets remain.

During my recent deployment to Iraq, I worked at the Corps level in C-3 Air Plans. My concerns regarding airspace were echoed by the midair collision between an OH-58D and a Raven Unmanned Aircraft System (UAS) in November 2004 above the skies of Taji, Iraq. This issue was first brought to light in the summer of 2004 when the deployment of Ravens began. The G-3 Air for 1st Cavalry contacted me and the Corps Airspace Manager to establish methods of control for the Ravens. A standard was needed that could be understood and used by all UAS operators in a fast-paced combat situation.

We relied heavily on communications to provide situational awareness to the aviators in the low-flying aircraft—mainly helicopters used that airspace. Air traffic controllers played a fundamental part in ensuring the positions of the UASs were known by those utilizing the airspace. UAS operators certainly understood the concerns of aviators. Even with the one midair that resulted in aircraft damage, the feat of placing so many resources in a small area of operation was unmatched and untested.

The interface between the Raven and the laptop controlling vehicle enables rapid analysis of accidents or incidents. *(Editor's note: The laptop that the UAS operator is using acts as a flight data recorder, recording movements of the aircraft as input by the operator and the systems/gauges for the UAS, such as altimeter, airspeed, etc.)* The continued working of procedures and doctrine, as well as the increased understanding of smaller UAS capabilities at lower levels in the military, will aid in better interaction between aviators and the UAS operators.

Since my return to the States, I am relieved to find that UASs (Raven, Shadow, etc.) have moved to Fort Rucker, AL, thus incorporating them into the warfighters' zone of concern and giving them a better understanding of all intricacies and issues of aviation and airspace. Using all available resources and bringing all warfighting tools to bear against our opponent is a must in today's shrinking, yet more effective, military machine. The Raven is a good asset and will be around for a long time, enabling the commander on the frontline to have better reliability with concerns of situational awareness, thus enabling him to mass his effects for maximum results.

The increasing congestion within airspace continues to be a concern for the Army. The rapidly changing battlefield does not lend itself to the slower, more rigid methods utilized by the Air Force airspace. Automation is on the forefront of changing technology, and the use of real-time applications and systems is required. Current airspace doctrine is being updated with the lessons learned in Operation Iraqi Freedom and Operation Enduring Freedom, and airspace management will continue to transform as new systems are placed into service and old methods and techniques must change. ♦

—LTC (Ret) Liebeknecht has worked in Army Aviation for over 20 years. He currently works at the Directorate of Simulation as a contract training analyst and TSP writer. He wrote this article while attending Aviation Safety Officer Course 05-004 at Fort Rucker, AL. He may be contacted at andrew.t.liebeknecht@us.army.mil.

Accident Briefs

Information based on preliminary reports of aircraft accidents

Class A

AH-64
A Model
• Class A: One crewmember suffered fatal injuries when the aircraft struck the ground during descent from level flight and caught fire.

AH-6
M Model
• **Class E:** During touchdown autorotation training, the tail stinger contacted the ground. Crewmembers conducted a visual inspection of the aircraft, noted the tail stinger was damaged, and terminated training. Maintenance inspected the aircraft, replaced the tail stinger, and returned the aircraft to service. *Late Report.*
• **Class E:** Aircraft experienced a bird strike to the left chin bubble. The crew returned to base for a precautionary landing without further incident. The chin bubble was replaced and the aircraft was returned to service. *Late Report.*

AH-64
A Model
• **Class E:** While in cruise flight, the Chips Nose Gear Box No. 1 light illuminated. The aircraft was flown back to home station with the No. 1 engine at idle. The crew conducted a single-engine landing and a normal shutdown. Maintenance inspection revealed the gearbox failed internally and it was replaced.
• **Class F:** Following a routine training mission without incident, subsequent HIT checks were out of tolerance. After performing a borescope of the No. 2 engine, the first stage compressor was determined to have significant damage.
D Model
• **Class E:** Following a landing in rugged, sloping terrain, the aircraft took off and flew a 2-hour mission. On completion of the mission, the aircraft landed on level terrain and shut down. The crew exited the aircraft and discovered the No. 2 FM antenna was cracked. *Late report.*
• **Class E:** During the return flight to the FOB, the No. 1 engine flamed out in conjunction with a No. 1 Engine Fuel PSI indication on the upfront display. The crew continued the flight and performed a single-engine landing without further incident. Inspection revealed the overspeed drain valve (ODV) had malfunctioned. The ODV was replaced, maintenance checks were performed, and the aircraft was returned to fully mission capable status.
• **Class E:** During cruise flight, both crewmembers smelled fuel vapors in the cockpit. The crew returned to the FOB without further incident. *Late Report.*

CH-47
D Model
• **Class C:** The copilot's door came off during flight. The aircraft returned to a local airfield without further incident.
• **Class D:** While conducting a dust landing, the bottom of the fuselage contacted the ground. The crewmembers heard a "thump," but no damage was visible from the crew stations and all cockpit indications were normal. During postflight inspection, the crew discovered the VOR and VHF antennas had been pushed into the fuselage, the FM homing antenna had been broken off, and minor surface airframe damage. *Late Report.*
• **Class D:** During cruise flight, a flock of large birds flew into the flight path of the aircraft, shattering the right-side pilot window and breaking through the center window and right chin bubble. The pilot on the controls was in the left seat and had a clear field of view. Due to the tactical situation, the PC elected to continue to the FOB less than 15 minutes away. Approximately 3 minutes after the first bird strike, another flock of birds struck the aircraft, breaking the left-side chin bubble. Upon landing and shutdown, the copilot noticed a pain in his right eye. He was treated for a small scratch on his cornea. No other crewmembers were injured. The aircraft sustained more than 15 individual hits from the pigeon-sized birds. *Late Report.*

MH-47
E Model
• **Class D:** Upon completion of a day maintenance test flight, the flight crew was tasked to recon a helicopter landing zone for landing suitability. On the third landing, the crew landed on a large rock. Damage to the aircraft was discovered on postflight inspection.
G Model
• **Class D:** Following over-water hoist operations training, damage to several antennas on the underside of the aircraft was discovered. It is suspected the hoist cable became entangled with the VOR antenna. The cable snapped off the VOR antenna; snared the TACAN antenna, causing damage; and scraped the PLS antenna. The cable also abraded the refuel probe at Station 70. *Late Report.*

MH-60
K Model
• **Class D:** The nose door came open during landing, shattering the center windshield. The aircraft was landed without further incident and taxied to parking for shutdown. Postflight inspection revealed the nose door was not secured properly. Late Report.

L Model
• **Class D:** A flock of birds flew into the aircraft, causing a spider web crack in the center windshield and a substantial straight-line crack in the pilot-side windshield. The crew landed safely at a FOB. Post-flight inspection revealed no further damage to aircraft. The windshields were replaced and the aircraft returned to service. *Late Report.*

OH-58D

(I) Model
• **Class D:** During a rocket firing maneuver, the pilot allowed the aircraft to fly too close to rocket burst debris. The debris destroyed the left-side chin bubble. *Late Report.*
D(R) Model
• **Class C:** Aircraft experienced NR/P spikes during FADEC training.

TH-67

A Model
• **Class C:** During standard autorotation training, the pilot trainee (PT) descended to 10 feet and applied collective to cushion the landing. The PT and instructor pilot (IP) noticed the rotor RPM was in the lower arc of the green range. The IP decided not to abort the maneuver. The decel did not increase the RPM, and at touchdown, the IP noticed the rotor RPM was below 70 percent. The aircraft incurred spike knock and was shut down. Maintenance noted damage to the isolation mount, driveshaft, swashplate, drag pin assembly, and freewheeling unit. *Late Report.*
• **Class C:** While conducting simulated anti-torque (nose left setting), the PT allowed the aircraft nose to go right of the centerline and then began to reduce throttle to bring the nose back left. The IP took the controls, landed in a level attitude, and slid sideways, resulting in spike knock. An inspection revealed damage to the drag pin, striker plate, K-flex driveshaft, and isolation mount. *Late Report.*

UH-60

A Model
• **Class E:** After departure, the stabilator failed. Emergency procedure was followed, and the aircraft was landed safely at an airport. The stabilator amplifier was replaced and the aircraft returned to service. *Late Report.*
• **Class E:** After a multi-ship mission, Chalk 2 noticed feathers and blood in the No. 2 engine inlet. The engine was inspected and cleaned. The aircraft was runup and a HIT check was performed. No damage was found to the aircraft or engine. *Late Report.*
L Model
• **Class E:** During the extraction phase of a combat multi-ship air assault operation, a crack was discovered in the pilot's windshield. It is suspected the crack was the result of a small rock or other FOD in the landing area. The crack was determined to be acceptable, and the mission was completed. Upon termination, the windshield was replaced and the aircraft returned to service. *Late Report.*
• **Class F:** The flight crew identified a torque split during a hover power check, aborted the takeoff, and returned to parking. Inspection revealed the engine inlet cover was not removed and part of the cover was wedged in the inlet, causing FOD damage to the engine. The HIT checks performed on the No. 1 engine failed to the high side. No other damage to the aircraft occurred during the incident. *Late Report.*

UC-35

A Model
• **Class E:** During descent to the airfield, the starter generator failed. The crew flew the aircraft back to home station. Maintenance inspected the generator and determined the bearings had gone bad. The generator was replaced by maintenance and the aircraft released for flight. *Late Report.*
• **Class E:** On takeoff, the pilot noticed the No. 2 engine ITT rising fast with an increase of power. During the flight, the pilot continued to monitor the ITT, which became progressively worse. The pilot was able to maintain the ITT within limits and fly to a repair facility airport, where a precautionary landing was preformed without further incident. Maintenance determined the No. 2 engine T1 sensor was malfunctioning. The aircraft was repaired and returned to service.

ARMY AIRCRAFT LOSSES FY02 TO PRESENT*

	HOSTILE/NON-HOSTILE	COST
AH-64A/D	8/44	$1.09B
U/MH-60L	6/23	$198.4M
C/MH-47	6/13	$718.9M
OH-58D	8/21	$181.2M
Total	28/101	$2.19B

*As of 15 August 2006

UNMANNED AIRCRAFT SYSTEM

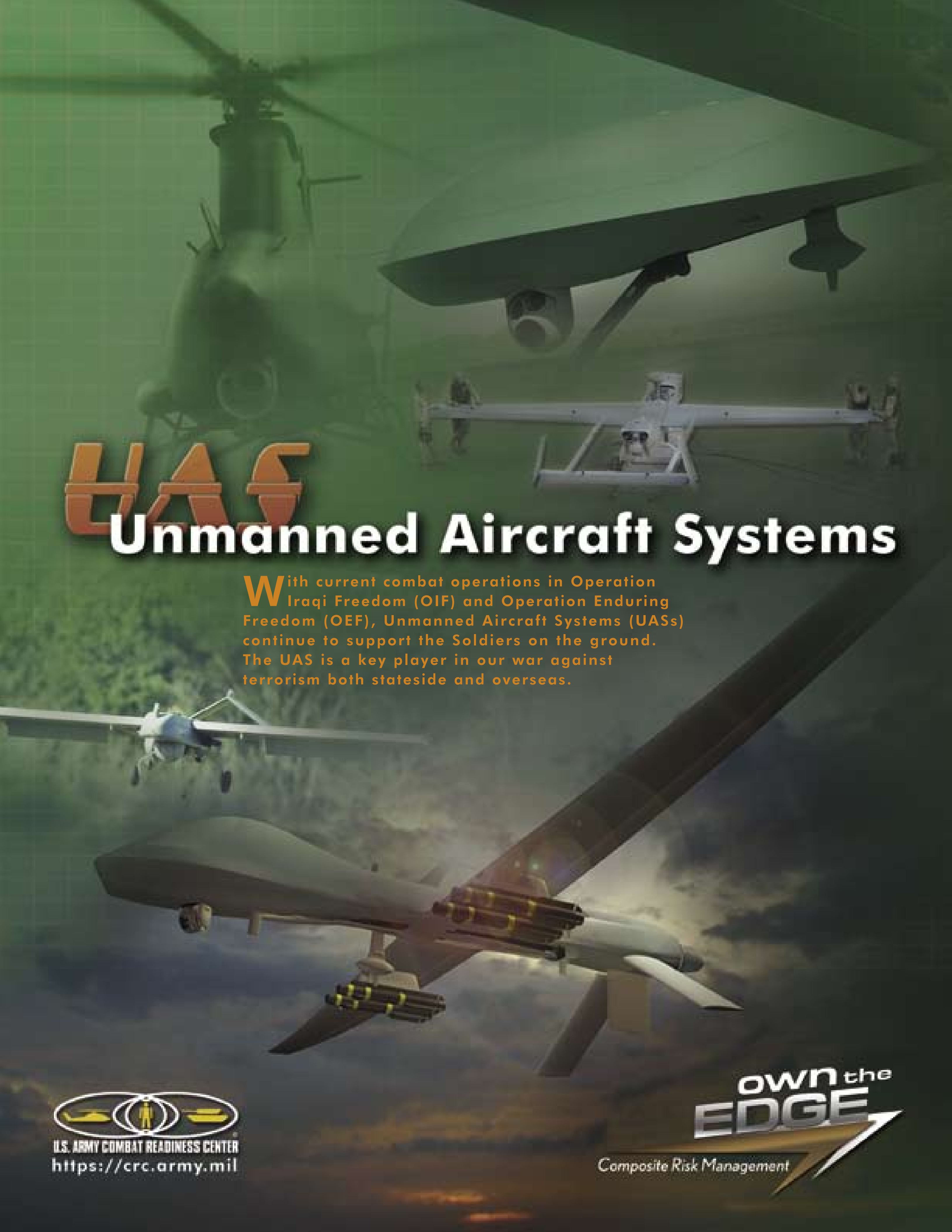
RQ-7B

• **Class B:** The data link with the Unmanned Aircraft System (UAS) was lost during its landing approach. The aircraft impacted trees and was a total loss.
• **Class C:** The UAS became airborne after touchdown and was trapped by the arresting net.

RQ-11

• **Class C:** Link with the UAS was lost during high winds. Efforts to locate the aircraft were unsuccessful.

Editor's note: Information published in this section is based on preliminary mishap reports submitted by units and is subject to change. For more information on selected accident briefs, contact the USACRC Help Desk at DSN 558-1390 (334-255-1390) or by e-mail at helpdesk@crc.army.mil.


UAS
Unmanned Aircraft Systems
With current combat operations in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), Unmanned Aircraft Systems (UASs) continue to support the Soldiers on the ground. The UAS is a key player in our war against terrorism both stateside and overseas.
U.S. ARMY COMBAT READINESS CENTER
https://crc.army.mil
own the EDGE
Composite Risk Management